

- 5 48. The nucleic acid of claim 39, wherein the polynucleotide encodes a variant protein of the lovE protein having a Group 4 amino acid residue mutated to a Group 5 amino acid residue at position 73.
- 10 49. The nucleic acid of claim 48 having the mutation C73R.
50. The nucleic acid of claim 39, wherein the polynucleotide encodes a variant protein of the lovE
- 15 protein having a Group 1 amino acid residue mutated to a Group 4 amino acid residue at position 101.
51. The nucleic acid of claim 50 having the mutation P101S.
- 20 52. The nucleic acid of claim 39, wherein the polynucleotide encodes a variant protein of the lovE protein having Group 1 amino acid residue mutated to a Group 3 amino acid residue at position 101.
- 25 53. The nucleic acid of claim 52 having the mutation P101Q.
54. The nucleic acid of claim 39, wherein the
- 30 polynucleotide encodes a variant protein of the lovE protein having a valine amino acid residue mutated to another Group 2 amino acid residue at position 111.
55. The nucleic acid of claim 54 having the mutation
- 35 V111I.
56. The nucleic acid of claim 39, wherein the polynucleotide encodes a variant protein of the lovE protein having a Group 4 amino acid residue mutated to a
- 40 Group 2 amino acid residue at position 133.
57. The nucleic acid of claim 56 having the mutation S133L.

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58. The nucleic acid of claim 39, wherein the polynucleotide encodes a variant protein of the lovE protein having Group 3 amino acid residue mutated to a Group 2 amino acid residue at position 141.

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59. The nucleic acid of claim 58 having the mutation E141V.

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60. The nucleic acid of claim 39, wherein the polynucleotide encodes a variant protein of the lovE protein having a Group 3 amino acid residue mutated to a Group 5 amino acid residue at position 141.

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61. The nucleic acid of claim 60 having the mutation E141K.

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62. The nucleic acid of claim 39, wherein the polynucleotide encodes a variant protein of the lovE protein having a Group 4 amino acid residue mutated to Group 6 amino acid residue at position 153.

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63. The nucleic acid of claim 62 having the mutation C153Y.

64. The nucleic acid of claim 39, wherein the polynucleotide encodes a variant protein of the lovE protein having a Group 4 amino acid residue mutated to a Group 5 amino acid residue at position 153.

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65. The nucleic acid of claim 64 having the mutation C153R.

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66. The nucleic acid of claim 39, wherein the polynucleotide encodes a variant protein of the lovE protein having a Group 4 amino acid residue mutated to a Group 1 amino acid residue at position 281.

5 67. The nucleic acid of claim 66 having the mutation
T281A.

68. The nucleic acid of claim 39, wherein the
polynucleotide encodes a variant protein of the lovE
10 protein having a Group 3 amino acid residue mutated to a
Group 2 amino acid residue at position 367.

69. The nucleic acid of claim 68 having the mutation
N367I.

15 70. The nucleic acid of claim 39, wherein the
polynucleotide encodes a variant protein of the lovE
protein having a Group 3 amino acid residue mutated to a
Group 6 amino acid residue at position 367.

20 71. The nucleic acid of claim 70 having the mutation
N367Y.

25 72. The nucleic acid of claim 39, wherein the
polynucleotide encodes a variant protein of the lovE
protein having a Group 1 amino acid residue mutated to
Group 4 amino acid residue at position 389.

30 73. The nucleic acid of claim 72 having the mutation
P389S.

74. The nucleic acid of claim 39, wherein the
polynucleotide encodes a variant protein of the lovE
protein having a Group 1 amino acid residue mutated to a
35 Group 2 amino acid residue at position 389.

75. The nucleic acid of claim 74 having the mutation
P389L.

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